THE LIFESCIENCES MAGAZINE

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LIFE SCIENCES ADVISORY
& INVESTMENT BANKING
Firm - 2024

OUTCOME CAPITAL

CASE STUDY
TMA Analysis
with StrataQuest

INDUSTRY OVERVIEW
An Introduction
to Digital Image
Analysis

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A Premier Life Sciences and Healthcare Advisory Firm Combining Scientific and Financial Knowledge with Transactional Expertise

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FROM EDIT

OR'S DESK

Unlocking the Future of Lifesciences!

Dear Readers,

In the dynamic and ever-evolving landscape of life sciences, knowledge is power, and strategic partnerships are the catalysts for transformative growth. It is with great enthusiasm that we present to you the latest issue of The Lifesciences Magazine, where we delve into the heart of the industry to spotlight the top advisory and investment banking firms shaping the trajectory of life sciences in 2023.

Outcome Capital, our cover story, takes you on a riveting journey through the corridors of innovation and financial acumen as we showcase the leading advisory and investment banking firms that are at the forefront of driving advancements in life sciences. These firms, armed with expertise, foresight, and a commitment to excellence, play a pivotal role in steering the industry towards new horizons.

In the pages that follow, you will find in-depth interviews and profiles of key influencers, visionaries, and thought leaders who are shaping the future of life sciences through their strategic insights and financial prowess. Gain valuable insights into the trends, challenges, and opportunities that are defining the industry landscape, and discover how these firms are positioning themselves as true catalysts for progress.

As we navigate the intricate web of science, technology, and finance, our goal is to empower our readers with knowledge that transcends traditional boundaries. The Life Sciences Advisory & Investment Banking Firm issue serves as a compass, guiding you through the complexities of the industry and providing you with a comprehensive understanding of the key players driving innovation and investment.

In addition to the spotlight on advisory and investment banking firms, this issue features thought-provoking articles, analyses, and case studies that offer a holistic view of the life sciences sector. From groundbreaking research initiatives to the latest technological advancements, our editorial team has curated content that reflects the diversity and vibrancy of the industry.

Thank you for being a part of our journey as we explore the remarkable achievements and innovations that are shaping the future of life sciences. We hope this issue inspires you, sparks curiosity, and instills a sense of optimism about the limitless possibilities that lie ahead.

Shalmali

Shalmali W.

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This list is NOT a ranking. The companies on listed in magazine serve different aspects of the market, making ranking them in any order except revenue impossible and unfair. We try to bring a perfect platform for business organization to showcase their valued products/ services.

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LEADERS IN SPOTLIGHT

On the cover of the magazine, we have featured Outcome Capital. Outcome Capital is combining extensive scientific and operational knowledge with financial expertise to help life sciences and healthcare companies with their strategic initiatives. Outcome's unique approach assists companies in carving out a clear path to transactions, the catalyst for growth and transformation, propelling innovation from laboratory to bedside.

Outcome Capital is a unique advisory and investment banking firm specializing in life sciences and healthcare. The firm, comprising industry veterans from various backgrounds, helps management teams and boards navigate a path to liquidity for ground-breaking innovations that benefit patients. The firm's expertise spans the industry including pharmaceuticals, biotech, medical devices, molecular diagnostics, digital health, and healthcare services, with seasoned executives from public and private life sciences companies.

Outcome's collective operational, financial and scientific expertise underpins its ability to assist companies to navigate the dynamics of their sector, evaluating multiple strategic options in an effort to mitigate risk while maximizing value. The firm offers comprehensive advisory services for private equity financing and M&A, including strategic partnerships.

Since its establishment, Outcome Capital has focused first and foremost on providing clients with actionable recommendations and defined strategies, which in turn, led to becoming a top middle market life sciences advisory and investment banking firm. Like many boutique firms, the initial challenge was establishing a highly differentiated brand in the financial services industry; specifically, one that exemplified the expertise of its team members. It firmly believed that the traditional investment banking approach didn't suit the complex life science industry, which demands a more tailored perspective. Hence, it aimed to focus on the daily challenges faced by life sciences CEOs, urging them to not only look internally at operating the business but also to consider external perspectives and market dynamics.

The company has gained recognition in the Boston life sciences ecosystem as a thought leader, publishing extensively in industry journals including Nature Biotech, Trends in Biotech, and MedTech Strategist, to name a few. Unlike traditional investment banks, which typically relay on a formulaic approach, Outcome offers each client a hands-on and tailor-made approach, which proves especially valuable for early-stage life science companies seeking to effectively communicate their unique value proposition to attract investors and strategic partners. The earlier the stage of a company's development, the more education is required for counterparties.

CONTENTS

12 | COVER STORY
OUTCOME CAPITAL

22 **RESEARCH REPORT SUMMARY**
Unveiling Growth Trends: A Comprehensive Overview of the Global Medical Devices Market

26 **GLOBAL EVENTS**
List of Global Events in Digital Pathology: Transforming the Future of Medicine

30 **ARTICLE**
Navigating Health: The Top Reasons for Medical Transportation

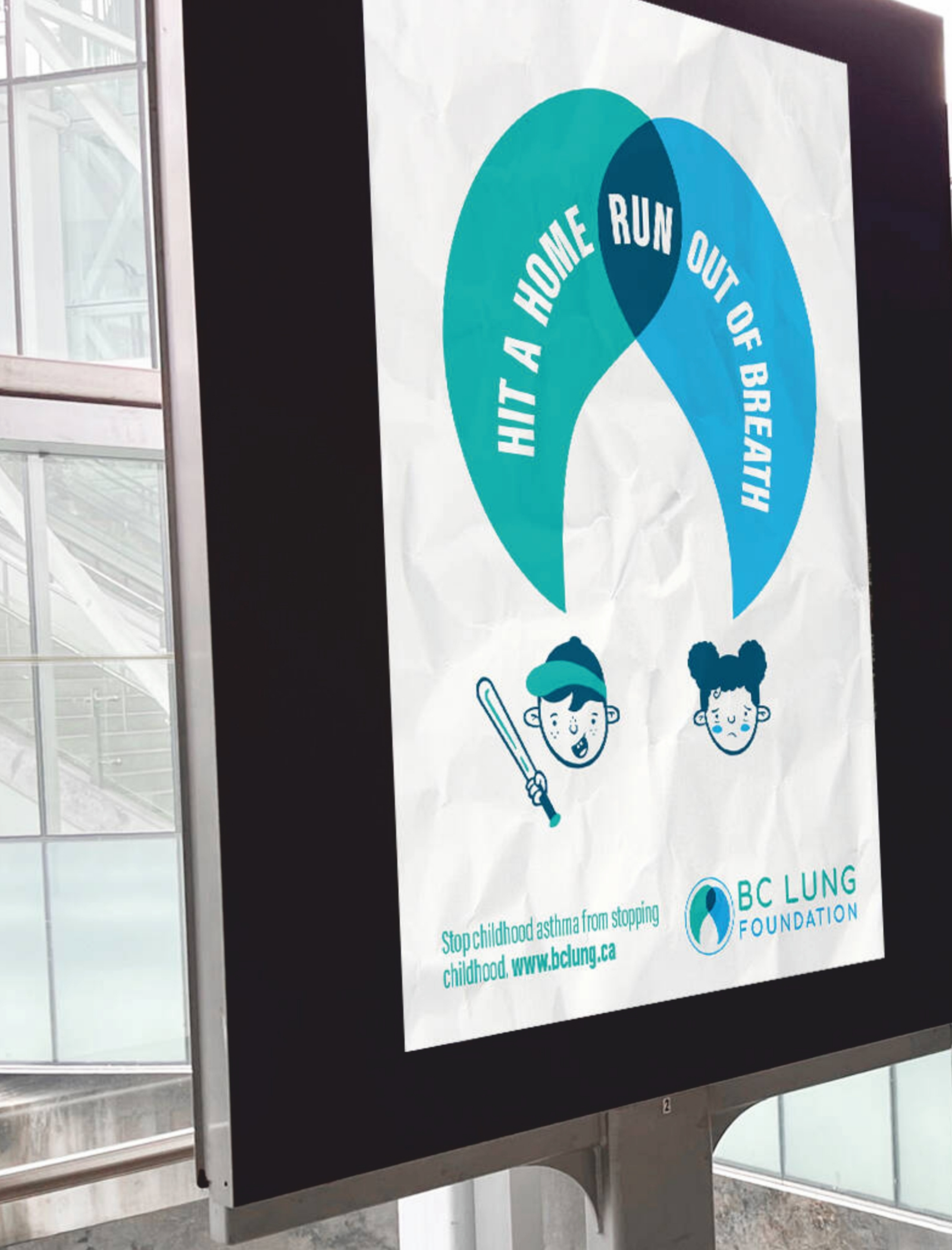
34 **CASE STUDY**
TMA Analysis with StrataQuest

38 **ARTICLE**
Shaping the Future of NEMT through Transformative Technology

42 **FUTURE TRENDS & NEWS**
KKR, Hologic, and Ajax Health Join Forces to Launch Innovative Medical Device Platform

44 **INDUSTRY OVERVIEW**
An Introduction to Digital Image Analysis

48 **FUTURE TRENDS & NEWS**
Transforming Real-Time Diagnosis of Brain Tumors: AI System Identifies Gliomas from Cryosection Images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Dr. Oded Ben-Joseph
Ph.D., MBA
Managing Partner

Arnold E. Freedman
Managing Partner

OUTCOME
CAPITAL

A Premier Life Sciences and Healthcare Advisory Firm Combining Scientific and Financial Knowledge with Transactional Expertise

COVER STORY

Dr. Paul Mieyal
PhD, CFA
Managing Director

The life sciences industry is extremely complex with value drivers extending far beyond financial metrics, and hence, facilitating transactions demands more than traditionally formulaic investment banking approaches. Outcome Capital is combining extensive scientific and operational knowledge with financial expertise to help life sciences and healthcare companies with their strategic initiatives. Outcome's unique approach assists companies in carving out a clear path to transactions, the catalyst for growth and transformation, propelling innovation from laboratory to bedside.

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Becoming A Key Industry Player

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At the core of Outcome Capital's senior leadership are numerous subject matter experts who bring complementary skill sets from across the life sciences industry, including former executives, venture capitalists, and scientists. Among them, **Oded Ben-Joseph, PhD, MBA** (**Managing Partner**), **Paul Mieyal, PhD, CFA** (**Managing Director**), and **Nick Frame, PhD** (**Sr. Vice President**) are scientists at heart with a strong affinity for new innovations, who believe their financial and operational backgrounds provide them with a unique perspective. Leveraging their scientific roots, their role as strategic advisors allows them to stay engaged with emerging technologies and assist in ensuring that groundbreaking technologies have sufficient capital to reach the patient.

Having spent years conducting scientific research, Outcome Capital's investment banking team interfaces with innovative companies working on treatments, cures, or procedures that can significantly impact the industry and translate to better clinical outcomes for patients. It is also involved in helping such companies devise effective strategies and navigate the strategic and financial markets. As the leadership team believes, the firm finds satisfaction in bridging the worlds of science and business, perceiving itself as an applied use of their scientific interests rather than the purely academic research they were previously engaged in. Essentially, Outcome Capital boasts its unique position at the intersection of science and finance, where it leverages its scientific expertise to actively contribute to advancing transformative technologies in the life sciences industry.

Being among those at the helm, Oded, Paul, and Nick assert that Outcome Capital effectively utilizes its multidisciplinary team beyond what might be expected within the investment banking industry. In contrast to a team comprised solely of MBAs and CFAs that are financially inclined, the Outcome team boasts integrated backgrounds of PhDs, MDs, MBAs, and CFAs which provide a valuable perspective within the life sciences sector.

Oded and Paul personify Outcome's identity – each has a formal education in both science and in finance. Oded earned his Ph.D. from the University of Cambridge and his MBA from the University of Bradford. Paul earned his Ph.D. from New York Medical College and is a Chartered Financial Analyst. They have each worked at institutional investment firms and been CEOs of companies. Outcome has a global presence with a European office in Switzerland and an affiliate office in China. This breadth of granular subject knowledge and hands-on experience is invaluable as they help management teams to work through the significant challenges in positioning their company for a successful transaction.

Debarring Traditional Investment Banking Notions

Outcome Capital emphasizes that, unlike traditional investment banking, life sciences transactions involve a variety of components beyond solely financial parameters. In the life science sector, scientific and clinical data often dictates a company's valuation, as opposed to conventional financial metrics like EBITDA or revenue. This unique aspect presents an inherent challenge, as clients lack familiar financial parameters to drive a transaction, and therefore must rely more on the understanding of the core technology behind the company. At early stages, it is critical to evaluate how a potential new treatment could change clinical practice, how it is differentiated from competing treatments in development, and how large of a potential commercial opportunity would result if the treatment is approved and successful. However, the firm's commitment to advancing science and medicine enables them to embrace this challenge, and it has been rewarding thus far. *"We're very committed to the advancement of life sciences. We decided to take the risk of a differentiated model, and it's been well received."*

A major factor that drives Outcome Capital's long-standing success is its unique approach of essentially operating as a client's corporate development function, which has led to the firm's modus operandi of "strategy first, execution second." This approach aligns with Oded and Paul's insights as their team will perform a deep level of internal due diligence prior to reaching out to potential investors or partners on behalf of clients. This diligence process ensures that the Outcome team deeply understands their client's scientific rationale and business objectives and needs, which allows them to assist in devising the appropriate outreach strategy and to be credible advocates. Taken together, Outcome seeks to increase the probability of success within the life sciences.

Their broad-ranging expertise and backgrounds allow the Outcome team to relate to clients from a technological standpoint, comprehending the what, why, and how of their endeavors. Most importantly, the team assists clients in translating their innovations into compelling business cases that can garner investment from various classes of investors or pique the interest of strategic players such as major pharmaceutical or medical device companies.

By integrating industry insights directly into the investment banking function, the firm distinguishes itself from larger, generalist banks. Unlike these institutions, where equity analysts and investment bankers operate in silos, Outcome Capital fosters an environment where industry expertise and experience are seamlessly integrated, creating a unique approach within the industry landscape. Outcome does not deal with retail investors nor publish analyst recommendations on publicly traded stocks. As such, Outcome is able to integrate and synthesize both its analytical and transaction expertise into a unified approach to most effectively advise its clients.

Diverse Team of Experts Leading to Organizational Success

Outcome Capital boasts a multidisciplinary team essential in the complex life sciences field. One person can't be an expert in every aspect of this industry, which encompasses early science, technology, regulations, commercialization, and the dynamics of payers and insurers. As a result, the firm prioritizes working with industry experts, maintaining a multifaceted leadership team, with openness to feedback, flexibility, and adaptability being the key drivers of growth and success.

One of the critical factors contributing to the firm's success is its deep operational experience. The team members have prior experience in senior leadership and have served as CEOs and business development professionals. This aspect helps establish robust relationships with the clients. Given that CEOs often experience isolation in organizations due to their vast responsibilities, they appreciate having access to individuals who understand the unique challenges of running a life sciences company. Outcome Capital creates specialized teams around clients to ensure they benefit from professionals who understand the specific science involved in respective processes. For example, an immunology-focused company will receive support from a team that includes immunologists or individuals with a fundamental grasp of the underlying science.

Arnold E. Freedman
Managing Partner

Dr. Oded Ben-Joseph
Managing Partner

The 'Greater Good' Vision of Advancing Medicine and Science

For any organization, harboring a growth mindset is also crucial for the people, while teamwork is central to its culture. Outcome Capital emphasizes each team member's personal development and contributions to the organizational level and the broader industry. It firmly believes that achieving results is vital, which requires disciplined execution.

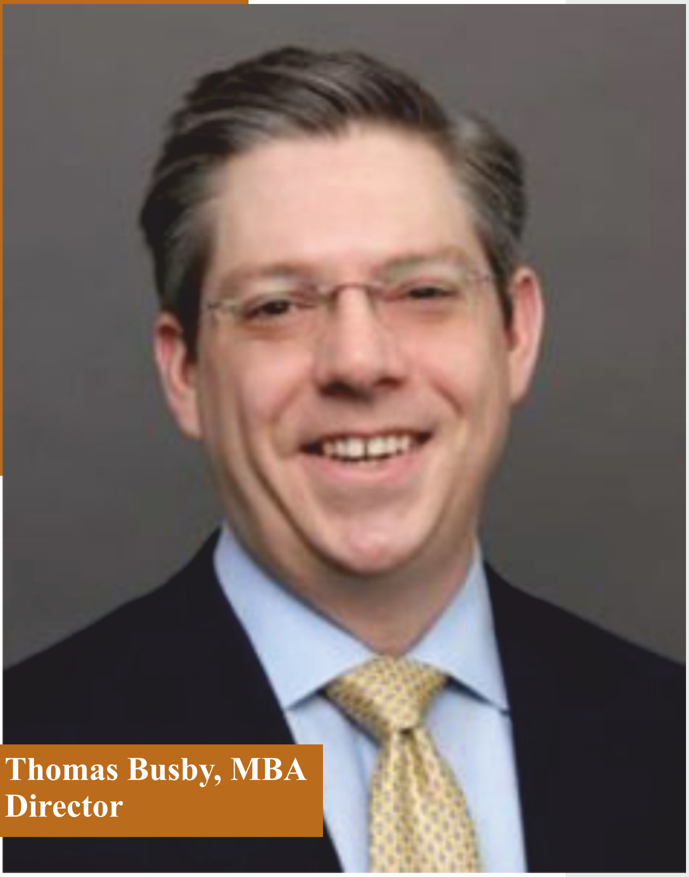
Outcome is strategically based in Boston to be immersed in the center of the U.S. biotech industry surrounded by prolific institutions such as Harvard, MIT, Tufts and Mass General as well as scores of healthcare-focused investment firms and business development teams from most major pharma and medical device companies. The firm focuses on building relationships with local universities, runs an internship program, and prioritizes a focus on assisting not only companies but individuals with a passion for the segment. The internship program integrates the firm and is consistent with its philosophy of cultivating relationships within the local ecosystem

At Outcome Capital, the shared vision is a commitment to advancing science. The firm highly prioritizes this vision, placing significant value on intellectual curiosity. Moreover, it focuses on ensuring the success of its client's technology while being highly selective about its client portfolio. Essentially, the firm assesses its clients based on its in-house expertise to assess the quality of the science. It primarily looks for technologies that can genuinely improve clinical outcomes for the benefit of patients.

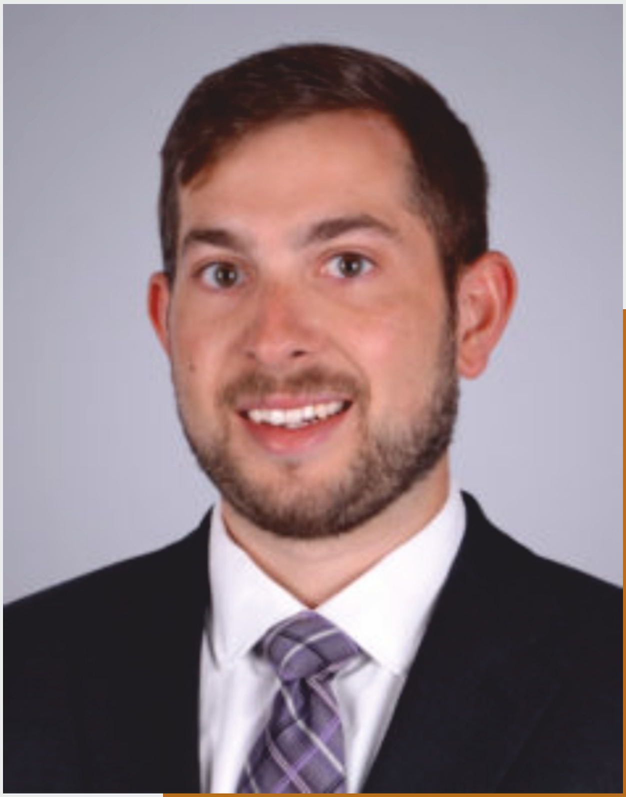
Additionally, it emphasizes discipline and execution, especially for first-time founders and CEOs of early-stage companies. While they often have novel technologies, Outcome Capital helps client companies avoid becoming long-term research projects by focusing on business-oriented milestones. This approach is crucial to attracting capital from investors, who are equally concerned with generating returns on their investments while delivering new drugs and devices to patients. Maintaining this balance often requires collective effort between the CEOs, advisors, and investors.

> *Internal execution is a means to creating assets, but interacting with external parties is required to guide the path to clinical and commercial success.*

COVER STORY



Thomas Busby, MBA
Director



Nicholas Frame, Ph.D.
Senior Vice
President

Pearls of Wisdom from Industry Experts

Despite the life sciences industry being in constant flux, Outcome Capital's commitment to creating distinct options for its clients and helping them to maximize their company's value is resolute and steadfast. Being among the industry's emerging leaders, the company is driven to usher technology from bench to bedside.

Presiding among the firm's senior leadership, Oded, Paul, and Nick advise aspirants to immerse themselves in the industry, including its complexities. Individuals with technical backgrounds often possess extensive research experience and knowledge in biology, biochemistry, and pharmacology. However, succeeding in the broader life sciences industry involves more than scientific expertise. It requires an underlying passion, and motivation to make a lasting impact.

Outcome recommends that entrepreneurs should embrace a statistical mindset, remain open to different perspectives, and avoid becoming too attached to one growth plan. Understanding the critical relationship between time, funding, and milestones is essential, and undercapitalization can hinder progress. Planning for potential delays and unforeseen challenges is crucial for successful risk management.

Additionally, entrepreneurs should not solely focus on their technology but also assess market adoption potential and consider partnering with larger companies for effective commercialization due to their resources, expertise and economies of scale. Seeking guidance from experienced professionals and strategic players can provide valuable perspectives and increase the chances of technology adoption and market success.

Assessing Current Trends to Strategize Future Progress

In the current market, a notable trend is the integration of technology and the blending of various elements. Technology giants like Apple and Google are entering the healthcare sector, establishing strategic partnerships with pharmaceutical companies and health systems, and developing their own products. Initially focused on monitoring and data collection, these companies now believe technology can greatly improve patient outcomes and streamline drug and medical device development processes.

Similarly, the potential influence of artificial intelligence (AI) is garnering significant attention in the current landscape. The leadership at Outcome Capital believes that integrating AI into healthcare attracts a broader range of technology-focused investors relative to the smaller pool of life sciences-specialized investors. Integrating AI offers the potential to automate and streamline drug development, addressing the soaring costs associated with therapy development, averaging $2.6 billion. AI's application spans drug discovery, preclinical models, data analysis, and patient selection in clinical trials. While AI is an exciting application for the life sciences, it's not the sole focus.

As technology becomes an increasing component, it is important to recognize that healthcare is a regulated industry subject to scrutiny by the FDA. This regulatory aspect presents distinct challenges and risks unfamiliar to typical technology investors.

To stay aligned with the ever-shifting landscape, Outcome Capital utilizes a team of strategic advisors who provide external expertise to ensure that the firm remains fully integrated and in sync with the market's direction.

Beyond the entrance of new players and adoption of additional technologies, the life sciences sector itself is in a constant state of advancement. The medical device field notably emphasizes incorporating technology and robotics to improve medical procedures. Innovative therapies like cell and gene therapies are emerging in biotechnology and pharmaceuticals, with a focus on shifting from treating diseases to finding potential cures. The diagnostics sector is witnessing advancements such as remote monitoring and the integration of AI, which can greatly enhance accuracy.

Although Outcome Capital has extensive experience spanning the entire life sciences spectrum, the company remains vigilant for emerging innovations within the industry. Rather than passively waiting for developments, the firm actively monitors, comprehends, and prepares to support and promote these advancements. Outcome regularly speaks with early-stage companies that may not be ready for institutional investors or strategic discussions. The company's benefit from Outcome's feedback and insights while these discussions help Outcome to stay abreast of emerging technologies and therapies within the competitive landscape.

Neurobiology, especially in neurodegenerative diseases, is experiencing renewed interest after a number of clinical disappointments in the 2000s. This resurgence has sparked investment and research activities in this domain. Outcome identified neurobiology early on as a significant area of growth as unmet clinical needs stimulate novel therapy development, reigniting commitment to addressing intricate healthcare challenges. The challenge of treating these diseases accurately extended beyond therapeutics to encompass diagnostics. Historically, Alzheimer's had been defined as dementia with amyloid beta plaques, yet this definition's causative validity has been debated, while the FDA adheres to this definition for drug development. Over decades, vast investments in Alzheimer's therapies and trials resulted in costly failures due partly to diagnostic limitations and therapy evaluation criteria. However, Eisai/Biogen's approval for an Alzheimer's drug and Eli Lilly's recent positive data injected renewed interest, reflecting the cyclic nature of optimism and apprehension in life sciences. This interest has extended beyond Alzheimer's into other neurological diseases including Parkinson's, ALS and Huntington's disease.

In a data-driven cycle reminiscent of oncology's evolution, diseases were initially broadly defined, often inadequate for individual patient conditions. Precision medicine, as noted by Oded, is crucial in diagnosing specific patient subclasses within disease categories, particularly in the diverse landscape of neurodegenerative and dementia-related diseases like Alzheimer's and Parkinson's.

Outcome's team believes that precision medicine holds the potential for tailored treatments, reflecting the progress seen in oncology. Beyond neurobiology, other fields such as immunology and genetic disorders are gaining prominence. Genetic disorders, marked by single mutations like sickle cell disease, stand to benefit from therapies such as gene therapy, offering potential cures rather than mere treatments. Additionally, cell therapy shows promise in replacing compromised cell types and potentially initiating an effective immune response to the underlying disease in certain cancer types.

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Research Report Summary

UNVEILING GROWTH TRENDS: A Comprehensive Overview of the Global Medical Devices Market

- The worldwide market for medical devices is a vital sector of the healthcare industry that is dynamic and changing

TABLE OF CONTENTS

- PREMIUM INSIGHTS
- MARKET TRENDS
- MARKET ASSESSMENT
- SWOT Analysis
- PESTEL Analysis
- IMPACT OF RECESSION ON THE MARKET
- GLOBAL MEDICAL DEVICES MARKET, BY PRODUCT, BY THERAPEUTIC APPLICATION, BY END USER
- COMPETITIVE LANDSCAPE
- COMPANY PROFILES

- **Global Medical Devices Market: Covid-19 Impact**

The worldwide market for medical devices has been significantly impacted by the COVID-19 pandemic. Disruptions to the supply chain, a rise in the need for personal protective equipment (PPE), and a decrease in elective procedures are all consequences of the pandemic. On the other hand, the pandemic has expedited the uptake of remote patient monitoring and telehealth.

GLOBAL MEDICAL DEVICES MARKET:

Growth Drivers

Technological Progress

Population Ageing

Restraining Factors

Regulatory Obstacles

Issues with Reimbursement:

Exorbitant Development Costs

Opportunity Factors

Technological Progress:

Markets in Emergence

At-the-Point Testing

Segmentation

Breathing apparatuses

Orthopaedic Tools

Medical facilities

GLOBAL MEDICAL DEVICES MARKET: REGIONAL INSIGHTS

NORTH AMERICA

With a projected value of USD xx billion in 2021, North America is the largest regional market for medical devices. Future market leadership is anticipated in this region, where there will be a compound annual growth rate (CAGR) of xx from 2024 to 2031.

EUROPE

At USD xx billion in 2021, Europe is the second-biggest regional market for medical devices. From 2024 to 2031, this region is predicted to grow at a CAGR of xx%.

ASIA-PACIFIC

With a CAGR of xx % from 2024 to 2031, Asia-Pacific is the medical device market with the fastest rate of growth among the regions. The rising incidence of chronic illnesses and the growing need for minimally invasive procedures are the main drivers of this growth.

GLOBAL MEDICAL DEVICES MARKET: KEY MARKET PLAYERS

- **Medtronic**
- **Johnson & Johnson**
- **Siemens Healthineers**
- **General Electric (GE) Healthcare**
- **Philips Healthcare**
- **Abbott Laboratories**
- **Stryker Corporation**
- **Becton, Dickinson, and Company (BD)**
- **3M Health Care**
- **Boston Scientific Corporation**

FAQs

What are the key factors driving the Global Medical Devices Market?

In the future years, the market for medical devices is anticipated to rise due to medical technology firms' increased investment in research and development (R&D) activities for the creation of novel and cutting-edge medical devices and the regulatory authorities' ease of approval for those products.

Which region will contribute ably towards the Global Medical Devices Market?

In 2022, the market was dominated by the North American region, which accounted for 38.7% of total revenue share.

What are the key players in Global Medical Devices Market?

DePuy Synthes, Medtronics Plc, Fesenius Medical Care, GE Healthcare and others are the key players in Global Medical Devices Market.

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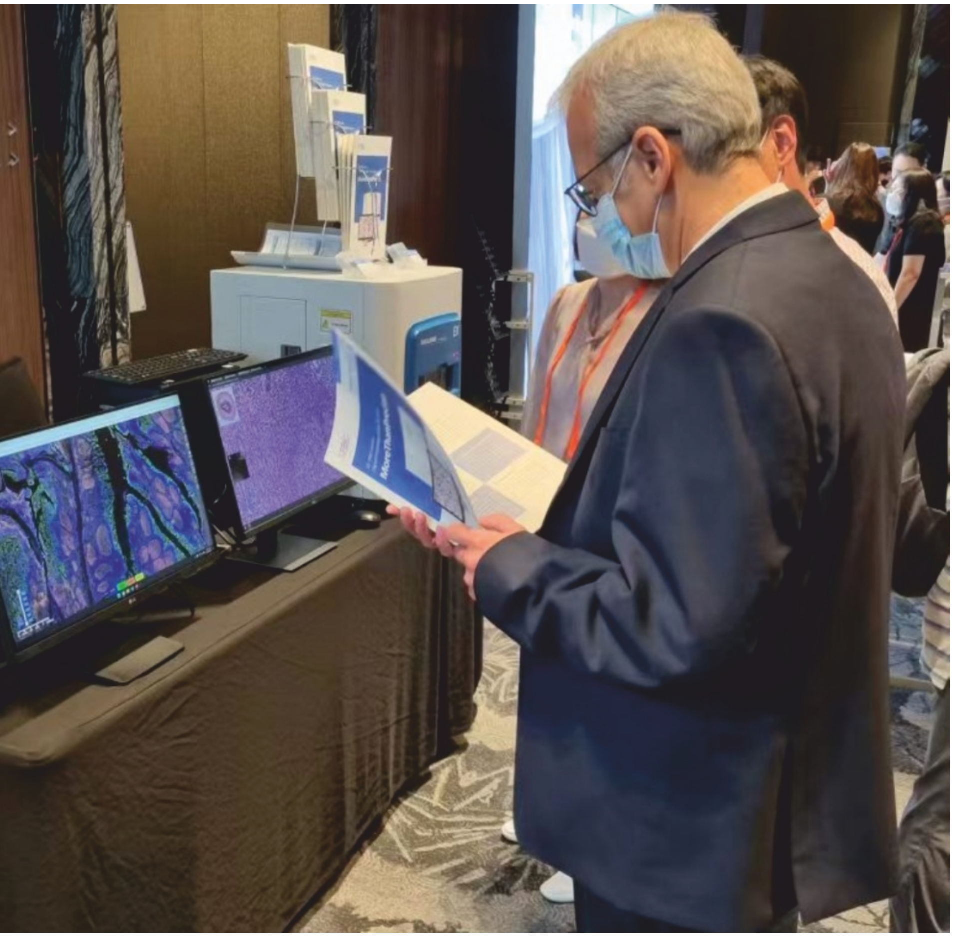
List of Global Events in DIGITAL PATHOLOGY: Transforming the Future of Medicine



Technology has reshaped the way we approach diagnostics and patient care in the healthcare sector. Among these ground-breaking developments, digital pathology has revolutionized the field of pathology and ushered in a new era of precision medicine. Over the years, traditional pathology has involved using glass slides and microscopes to examine tissue samples. This method has its drawbacks like human errors and time limitations.

However, with digital pathology, a significant transformation has occurred. Digital pathology utilizes advanced technology to transform those tiny tissue images into high-quality digital files. This change allows pathologists and medical experts to study these specimens from a distance, work together effortlessly, and take advantage of AI. Resulting in boosting precision and efficiency in the analyses. In essence, digital pathology represents a shift from manual, hands-on

processes to a more high-tech approach, benefiting both healthcare professionals and patients. If you are a health professional or a student of pathology, the need to stay updated in this continuously evolving sector is essential.

Here is a List of Global Events Occurring in the World of Digital Pathology

- **DAPA Grand Rounds:** 13th November, 2023. (Virtual)
- **DPA Webinar:** 16th November, 2023. (Virtual)
- **Digital Pathology & AI Congress:** Asia, Singapore. 10th -11th Sep 2024.
- **International Spatial Biology Congress:** Rotterdam, Netherlands. 11th -12th Jul 2024.
- **Spatial Biology Congress:** San Diego, USA. 9th -10th May 2024.
- **FSP Annual Meeting:** Orlando, FL. 16th - 18th February 2024.
- **USCAP Annual Meeting:** Baltimore, MD. 23rd - 28th March 2024.
- **PI Summit:** Ann Arbor, MI. 20th - 23rd May, 2024.
- **NSH Convention:** New Orleans, LA. 20th - 24th September, 2024.
- **CAP:** Las Vegas, NV. 19th - 22nd October, 2024
- **PathVisions24:** Orlando, FL. 3rd - 5th November, 2024.

As we conclude our exploration of global events in digital pathology, it becomes evident that this field is on the road to a transformative journey in healthcare. The cutting-edge technologies, international collaborations, and pioneering research have reshaped the way we practice pathology. From the digitization of microscopic images to the implementation of AI, digital pathology is enabling more accurate and efficient diagnoses. It stands as a testament to innovation and collaboration for better patient care and improved outcomes worldwide.

Keeping track of the global events listed above will help you dive into the knowledge of present situations, problems faced, and the solutions to overcome them.

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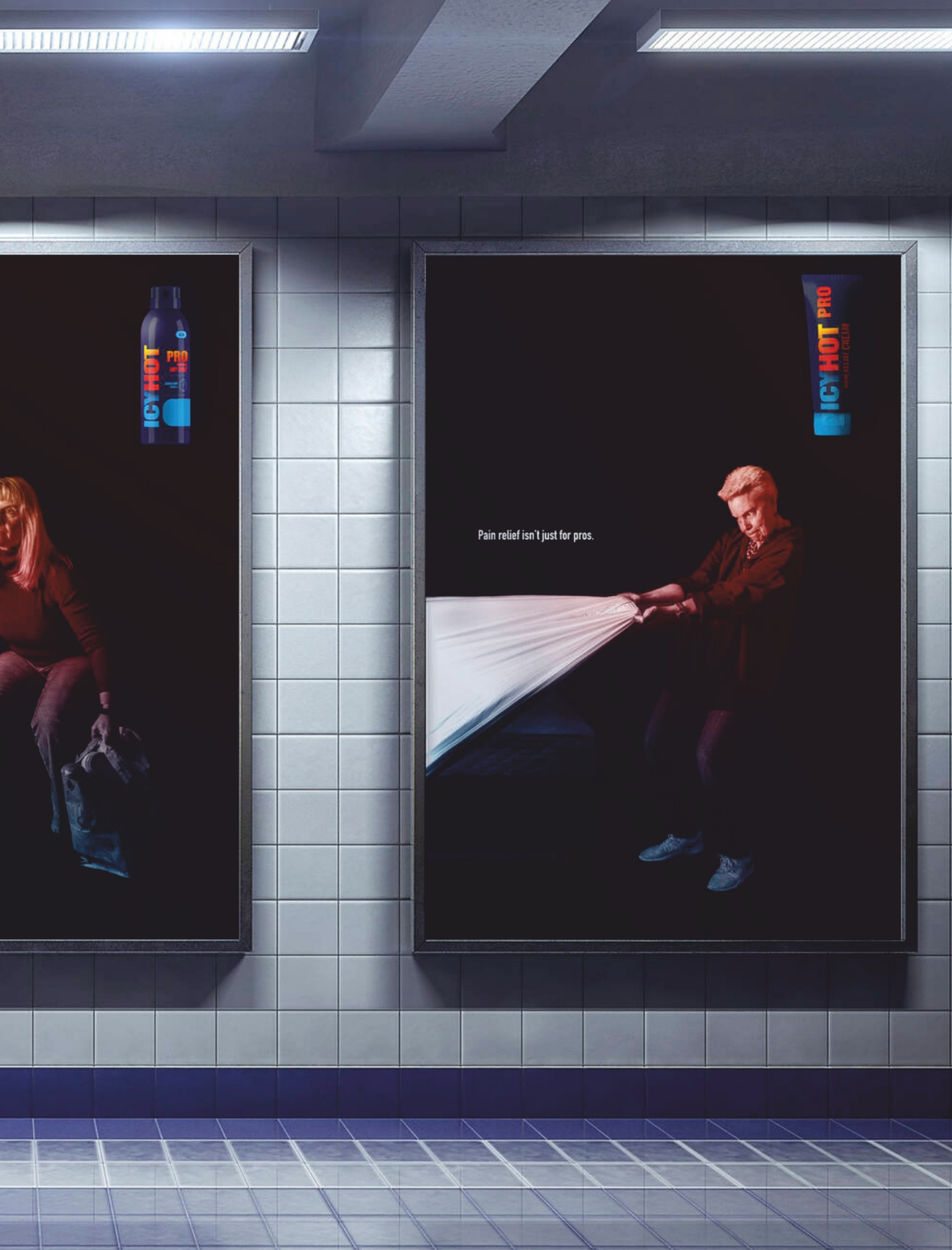
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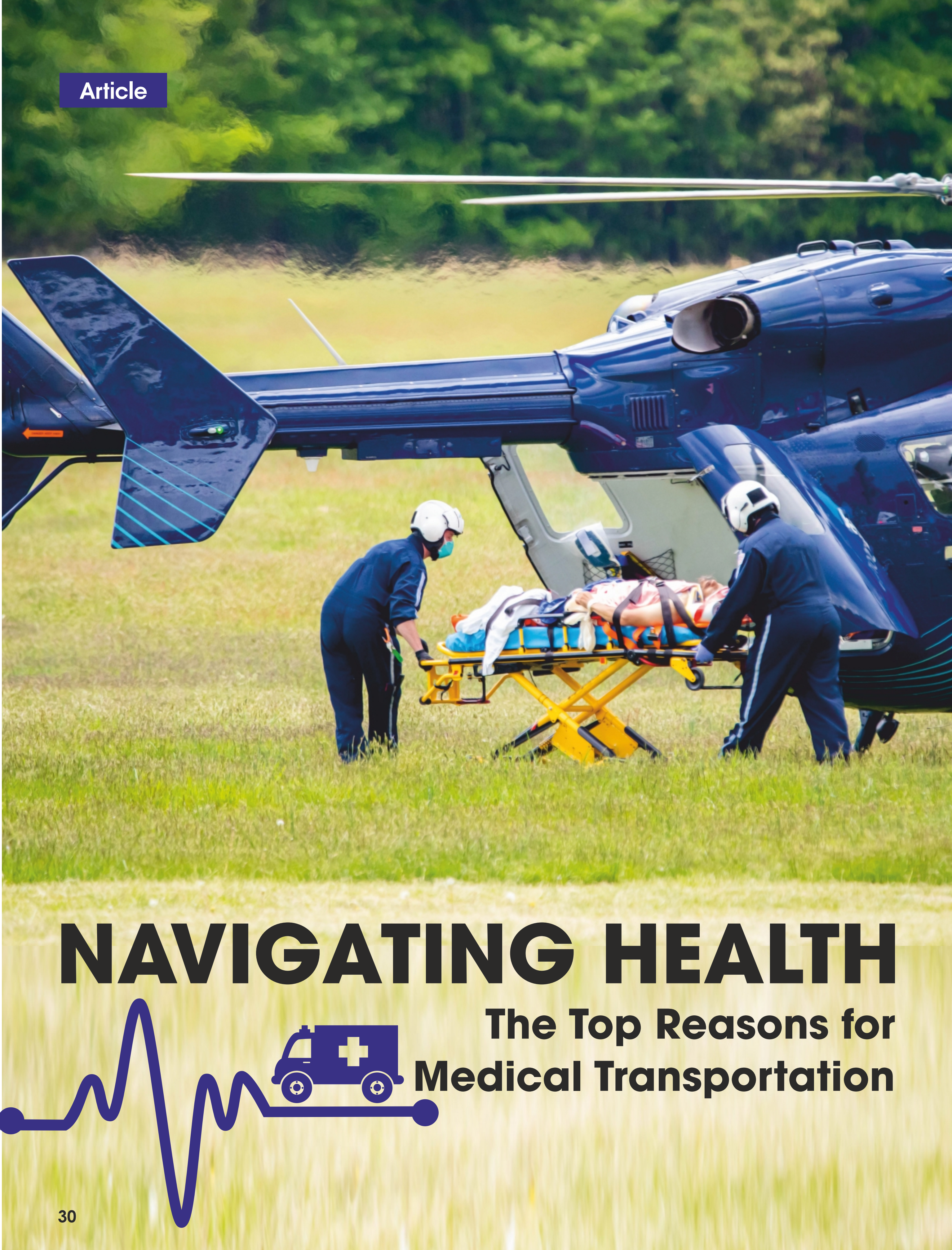

NAVIGATING HEALTH

The Top Reasons for Medical Transportation

Introduction

In the complex landscape of healthcare, medical transportation plays a vital role in ensuring individuals have access to necessary medical services. From routine check-ups to emergency situations, the need for reliable and efficient transportation is paramount. This article explores the top reasons for medical transportation, shedding light on the diverse scenarios where this service becomes crucial for individuals seeking healthcare.

Access to Routine Medical Appointments

One of the primary reasons for medical transportation is to facilitate access to routine medical appointments. Many individuals, especially those with mobility challenges or living in remote areas, rely on transportation services to reach healthcare providers for regular check-ups, preventive care, and follow-up visits. This ensures continuity in their healthcare management and contributes to overall well-being.

Specialized Treatment and Consultations

Patients often require transportation services when seeking specialized treatment or consultations with healthcare specialists. Access to these experts may involve traveling to medical facilities located in different cities or regions. Medical transportation becomes a lifeline for individuals facing complex health conditions, ensuring they can access the expertise needed for accurate diagnosis and appropriate care.

Non-Emergency Hospital Transfers

In non-emergency situations, individuals may need medical transportation for hospital transfers. This could involve moving patients between healthcare facilities for continuity of care, specialized procedures, or to access specific medical services that may not be available at their current location. The efficiency and reliability of medical transportation services become crucial in such scenarios.

Dialysis and Ongoing Treatment

Patients undergoing regular treatments such as dialysis or ongoing medical therapies often require reliable transportation to healthcare facilities. Dialysis, for example, is a recurring treatment that individuals with kidney conditions undergo regularly. Medical transportation ensures these patients can adhere to their treatment schedules, promoting better health outcomes and quality of life.

Senior Citizen Healthcare Needs

Elderly individuals frequently rely on medical transportation for their healthcare needs. As mobility can become a challenge with age, seniors may require assistance in reaching medical appointments, undergoing tests, or attending rehabilitation sessions. Medical transportation services cater to the unique needs of senior citizens, supporting their access to essential healthcare services.

Maternal and Neonatal Care

Pregnant women and new mothers, particularly those living in rural or underserved areas, often depend on medical transportation for prenatal and postnatal care. Access to regular check-ups, ultrasound appointments, and follow-up visits is critical for maternal and neonatal health. Medical transportation bridges the gap, ensuring expectant mothers receive the care they need.

Emergency Medical Situations

While emergency medical services (EMS) handle acute situations, there are instances where individuals require transportation for urgent medical needs that are not life-threatening emergencies. Medical transportation services play a crucial role in swiftly transporting patients with urgent but non-emergent conditions to medical facilities, ensuring timely care and intervention.

Rehabilitation Services

Individuals undergoing rehabilitation, whether for post-surgical recovery or the management of chronic conditions, may require transportation to rehabilitation centers. Access to physical therapy, occupational therapy, and other rehabilitation services is vital for enhancing recovery and improving the overall functional capacity of patients.

Cancer Treatment and Oncology Visits

Cancer patients undergoing chemotherapy, radiation therapy, or regular oncology visits often face challenges in transportation, especially if treatment centers are located at a distance from their homes. Medical transportation becomes an indispensable service in ensuring cancer patients can access vital treatments and consultations without undue stress or logistical barriers.

Mental Health Support

Transportation services are essential for individuals seeking mental health support. Whether attending counseling sessions, therapy appointments, or mental health facilities, reliable transportation contributes to the accessibility of mental health services. This is particularly significant in reducing the stigma associated with mental health and encouraging individuals to seek the care they need.

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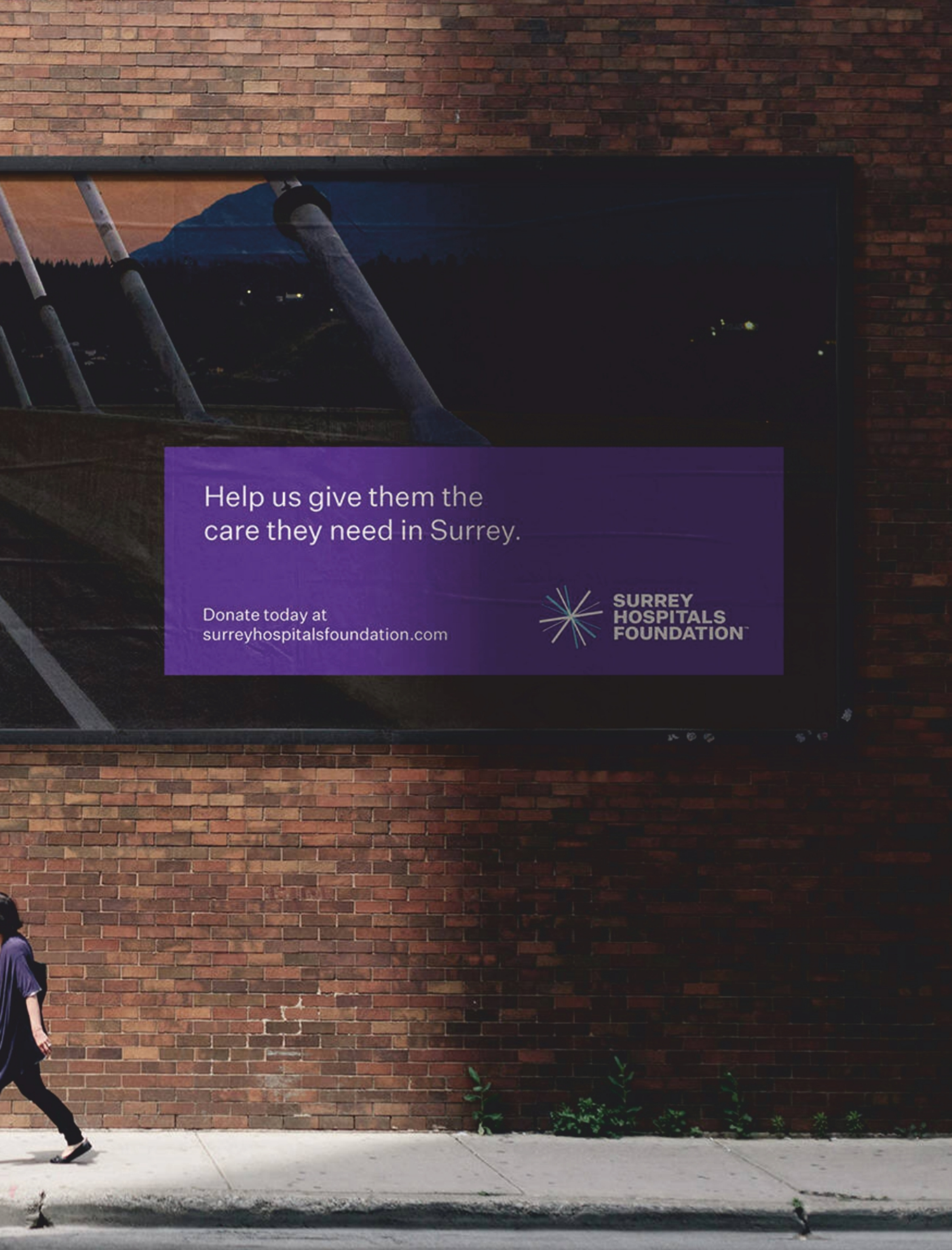
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Case Study

TMA Analysis with StrataQuest

Tissue microarrays (TMAs) have proven themselves as a standard molecular clinical diagnosis technique. TMAs are paraffin blocks in which up to 1000 individual tissue cores assembled in array fashion, allowing high-throughput histological analysis.

The TissueFAXS platform including the high-end image analysis solution StrataQuest provides specific workflow to scan and analyze the TMA samples containing multiple regions on one slide. TMA analysis in StrataQuest is available for images acquired in all imaging modalities (multispectral, fluorescence, bright field).

In the first example, StrataQuest was utilized to analyze a TMA sample stained for hematoxylin (blue) and for E-cadherin present in the cell membranes of epithelial cells (brown). On the original image (a), E-cadherin is shown in brown and nuclei in blue. The aim was to detect the nuclei, the epithelial cells and the membranes of epithelial cells. The challenge with this analysis was that some cells do not contain nuclei.

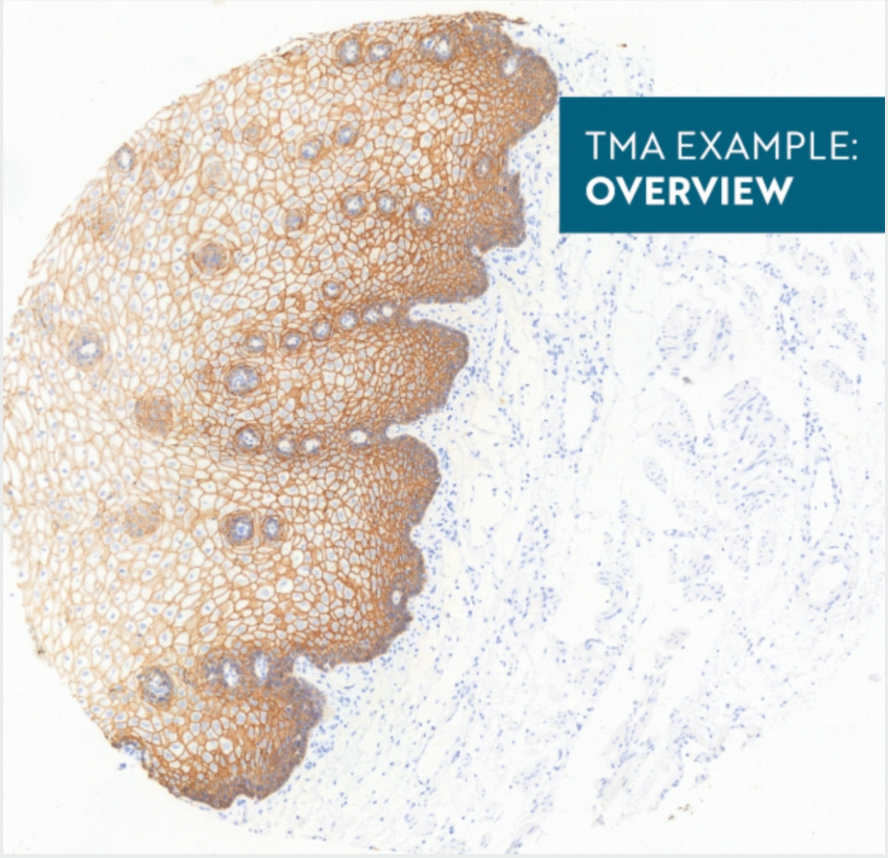
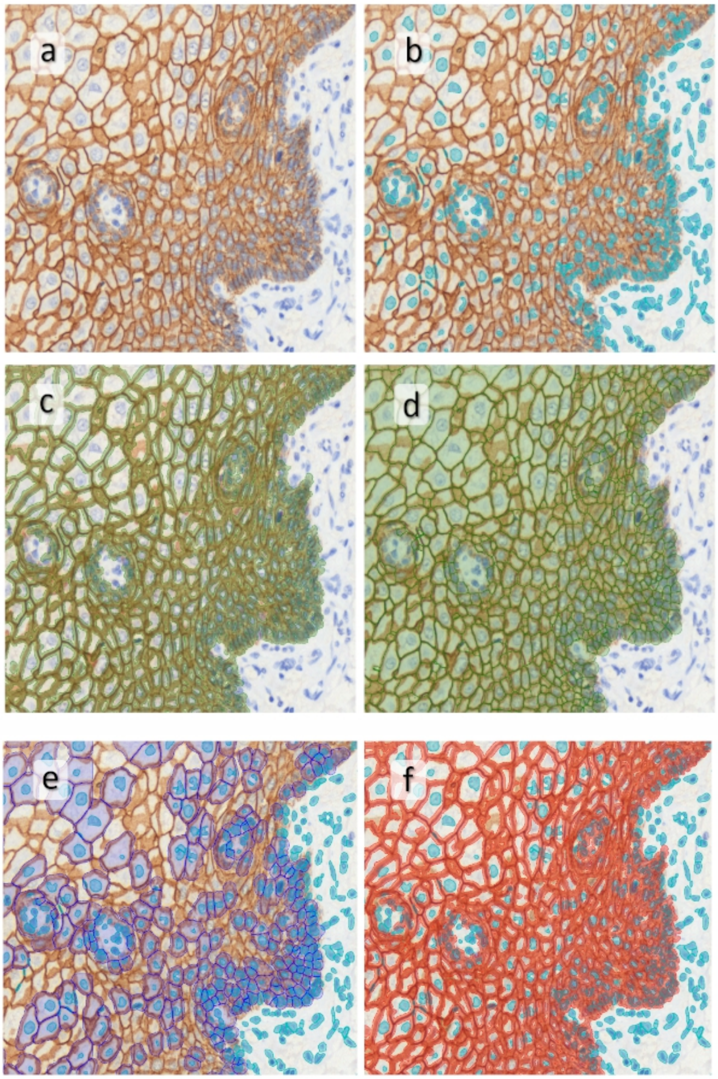
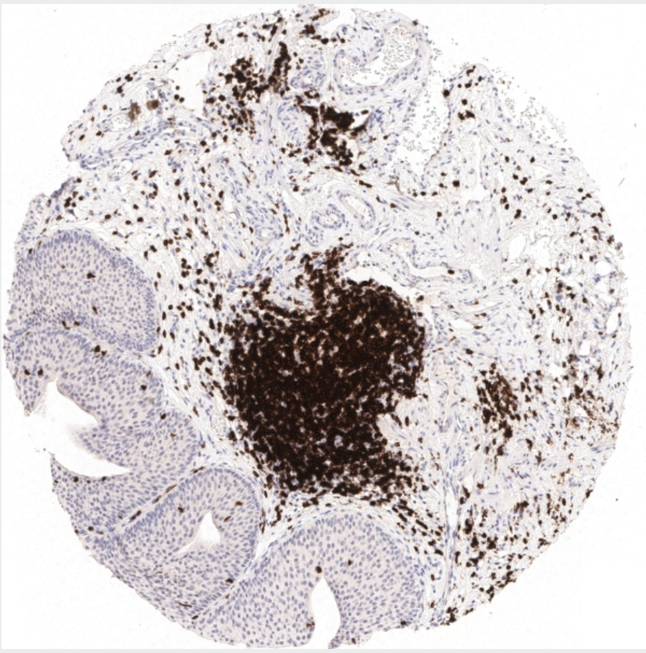


Image (b) shows detected nuclei, covered by nuclei mask in light blue. Next only membranes were detected (c), which are shown in green; (d) shows the detection of the whole E-cadherin+ epithelial tissue, also marked in green.

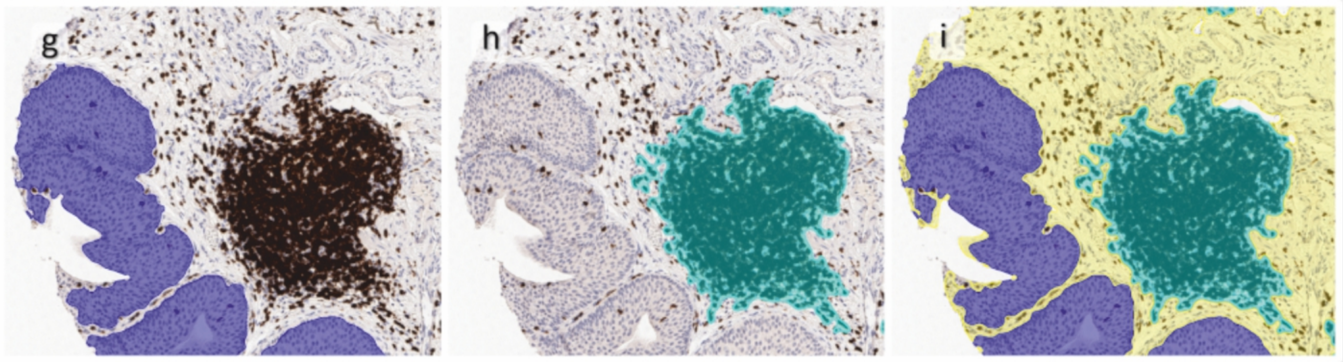


In image (e) only cells with nuclei are identified, and the whole cell with the membrane is shown in blue, while the nuclei are covered by the light blue nuclei mask; (f) represents the nuclei in light blue and the total membranes in red.

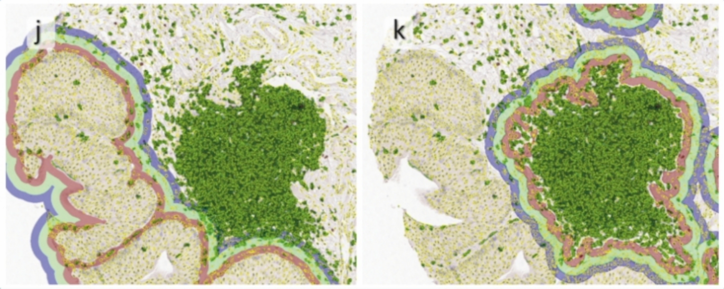
Another example on TMA analysis is our IHC Immune Status in situ APP. Here the task was to develop a streamlined workflow for tissue classification (epithelium, stroma, lymphoid cluster).
Marker positive cells (for CD3+) were identified and spatial analysis was peformed, which would allow for the calculation of how many and which types of cells are located in defined distances from the object of interest (epithelium or lymphoid cluster). In the below example the App was applied to Tissue Microarrays (TMA) of an inflamed bladder.



One of the most notable features of StrataQuest is the machine learning-based tissue classification. To train the algorithm, the user marks regions assigned to different tissues and trains the classifier on the sample; later this workflow can be used on other samples. The following images represent the outcome of the classifier: (g) epithelium is detected in blue; (h) displays the lymphocyte cluster in light blue. These algorithms (or masks) can be combined to achieve a better visualization: (i) epithelium is displayed in blue, lymphocyte cluster in light blue and stroma in yellow.

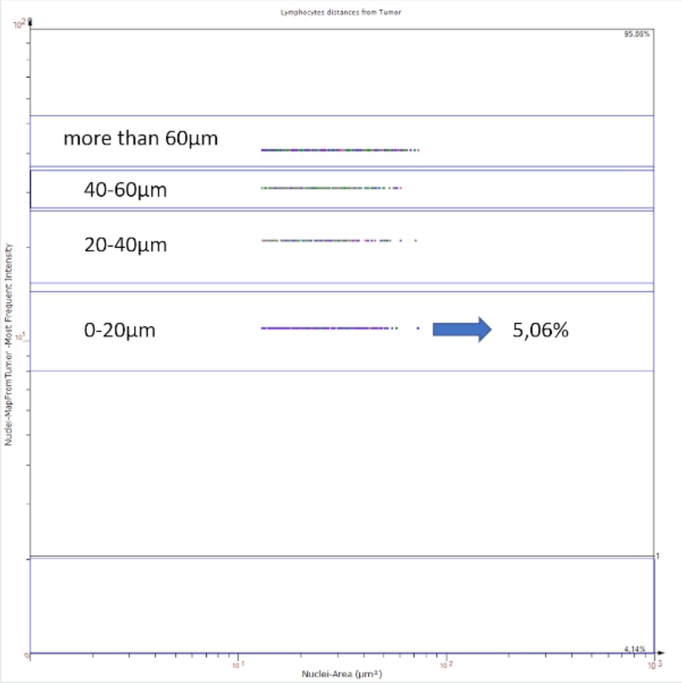


Beside the tissue classification itself, StrataQuest is capable of performing proximity analysis. It is possible to define specific proximity ranges; in the following case each range marked by different colors is 20µm. Nuclei detection was applied and CD3+ cells are shown in green, negative cells in yellow; (j) proximity ranges for the epithelium and (k) proximity ranges for the lymphocyte cluster.



Apart from visual image analysis, StrataQuest outputs quantitative numbers. This way, it is possible to acquire and validate much more information. For example, StrataQuest can show how many cells are detected in each range: through the establishment of gates, 5.06% of CD3+ cells were found to be very close (in 20 µm range) to the epithelium.

Further details about our various products and services can be found on our website. If you are interested in learning more about TissueGnostics solutions for TMA application or other tissue cytometry applications and our related services, please reach out to a member of the TissueGnostics team.



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Article

Shaping the Future of NEMT through Transformative Technology

Non-Emergency Medical Transportation (NEMT) is at the forefront of a technological revolution. Technology has become the cornerstone, enhancing efficiency and customer experiences in businesses. Medical transportation, with its focus on breaking down access barriers and ensuring patient safety. It is leveraging these technological advancements to redefine the future of patient transportation. It stands as a crucial element, striving for equitable access to healthcare services for all. Technological innovations, particularly mobile apps and platforms, are reshaping the landscape, offering streamlined booking and coordination of NEMT services. This provides convenience for patients and holds the promise of improving care quality and reducing healthcare disparities.

Consequences of Outdated Technology in the Medical Transportation Sector:

As a crucial component of the Medicaid program, the NEMT industry operates on a vast scale. Inefficiencies and malpractice within this sector not only lead to the mismanagement of funds but also contribute to the loss of billions in revenue, ultimately driving up healthcare costs.

Fraud:

The reliance on traditional methods such as phone and fax for tracking trips in NEMT creates opportunities for fraud.

Missed Medical Appointments:

The lack of streamlined systems results in an increased number of missed medical appointments.

Unnecessary Service:

Upcoding, means charging for unnecessary medical devices and support companies earn their profit through this practice.

Extra Cost for Same Service:

If a regular vendor is unavailable, one may have to rely on another provider and can cost more.

Technology-Driven Solutions:

Non-emergency medical transportation dispatch software solution rigorously focuses on all levels of operational care providing reliable services such as:

- Healthcare organizations find it easy to manage non-emergency medical transportation operations, handling trips, drivers, vehicles, and clients all in one place. With just a click, they can effortlessly create, plan, schedule, and track trips. The software collects data for operational insights and performance reports.
- Transport providers can efficiently schedule patient transportation requests based on their needs. They streamline other transportation tasks like vehicle allotment, billing, and communication with drivers, enhancing overall service.
- Drivers receive real-time patient transportation requests, enabling them to navigate routes seamlessly for smooth pick-up and drop-off. They can also keep track of trip departures and arrivals.
- Medicaid beneficiaries can quickly access on-demand transportation services for medical needs, resulting in improved health, better care, and reduced costs.

The Beginning of a New Tech-Era:

1. The Dawn of Tech:

Traditionally viewed as a logistical challenge, NEMT has undergone a drastic shift with the infusion of technology. The integration of digital platforms, real-time tracking, and data analytics has elevated non-emergency medical transportation beyond a mere transport service. These technological advancements have brought forth a new era of efficiency, and improved patient outcomes.

2. Smart Scheduling and Routing:

One of the primary challenges in this sector has been optimizing routes to ensure timely and efficient transportation for patients with diverse needs. Smart scheduling algorithms and GPS-based routing systems have emerged as game-changers. These technologies enable providers to streamline routes, reduce transit times, and enhance the overall experience for patients.

3. The Rise of Mobile Apps:

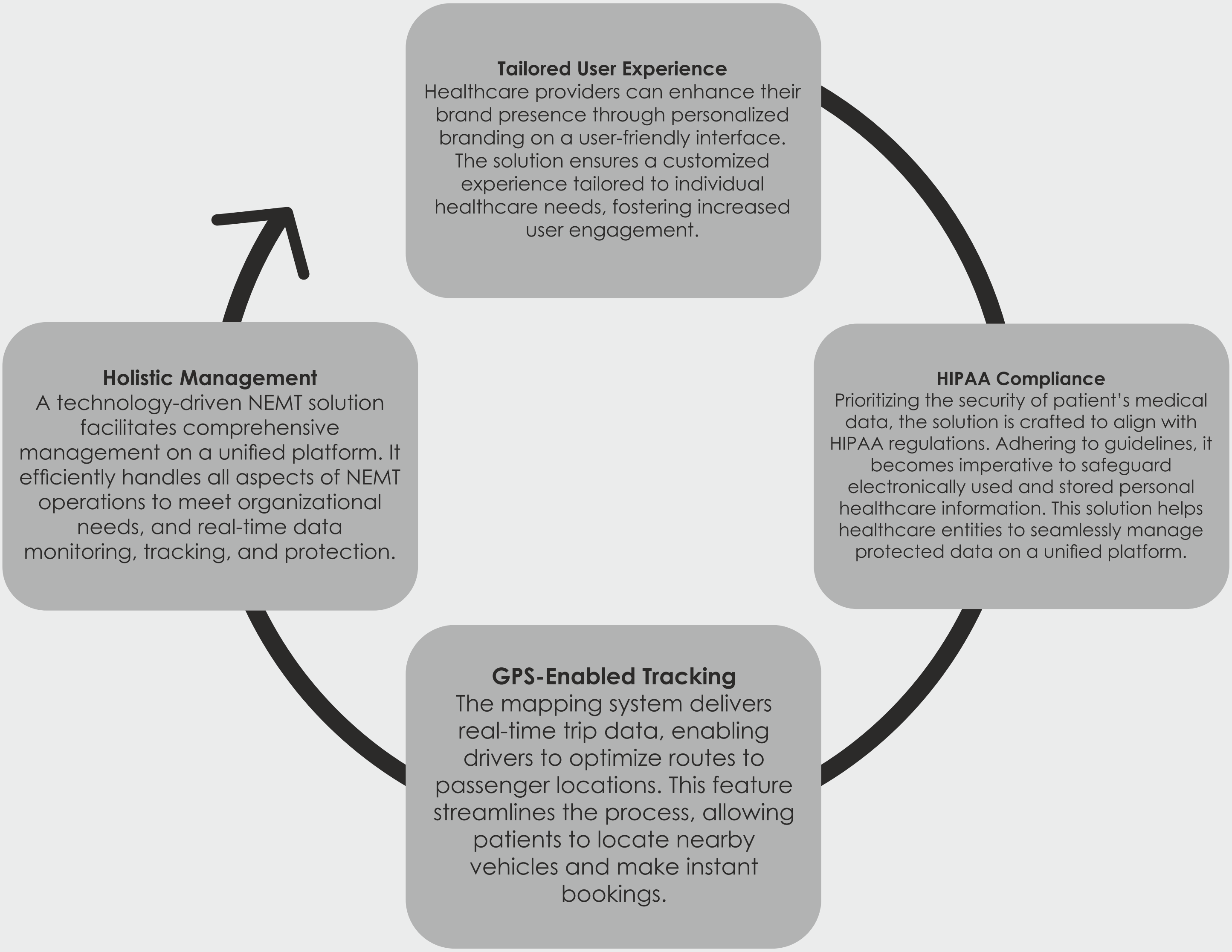
Mobile apps have become instrumental in revolutionizing non-emergency medical transportation. Patients can now schedule rides, track their transportation in real-time, and receive important updates through user-friendly apps. This empowers patients with greater control and transparency in the entire transportation process.

4. Telehealth Integration:

The bond between medical transportation and telehealth has paved the way for comprehensive healthcare solutions. Integrating telehealth features into non-emergency medical transportation services ensures that patients can receive virtual consultations during transit. This optimizes time and enhances the continuum of care.

5. Challenges and Solutions:

Despite the advantages, the tech transformation in non-emergency medical transportation is not without its challenges. Issues such as digital literacy among elderly patients, data security concerns, and the initial cost of implementing advanced technologies pose hurdles. However, ongoing efforts to address these challenges are underway. Digital literacy programs aim to educate elderly patients on using technology for medical transportation services, ensuring that the benefits of innovation are accessible to all demographics. Additionally, stringent measures and protocols are being established to safeguard patient data, fostering trust in the digital infrastructure.



Tailored User Experience
Healthcare providers can enhance their brand presence through personalized branding on a user-friendly interface. The solution ensures a customized experience tailored to individual healthcare needs, fostering increased user engagement.

HIPAA Compliance
Prioritizing the security of patient's medical data, the solution is crafted to align with HIPAA regulations. Adhering to guidelines, it becomes imperative to safeguard electronically used and stored personal healthcare information. This solution helps healthcare entities to seamlessly manage protected data on a unified platform.

GPS-Enabled Tracking
The mapping system delivers real-time trip data, enabling drivers to optimize routes to passenger locations. This feature streamlines the process, allowing patients to locate nearby vehicles and make instant bookings.

Holistic Management
A technology-driven NEMT solution facilitates comprehensive management on a unified platform. It efficiently handles all aspects of NEMT operations to meet organizational needs, and real-time data monitoring, tracking, and protection.

Conclusion:

Embracing innovation is the key to transforming the medical transportation industry, riddled with fraud and financial inefficiencies. Cutting-edge technology introduces a drastic shift, fostering transparency and reliability. Abandoning outdated methodologies and incorporating essential functionalities tailored to the NEMT sector's needs is essential for sustainable growth. An updated, technology-driven system not only streamlines operations but also elevates healthcare standards, contributing to reduced costs. This, in turn, indirectly enhances overall quality of life by ensuring access to well-coordinated and dependable transportation services. The path to progress in the NEMT industry lies in a forward-looking approach, where the integration of technology becomes the cornerstone for a more secure, and patient-centric future.

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his bones,
Pete
can focus
on restoring
a classic.

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NEWS THIS WEEK

KKR, HOLOGIC, AND AJAX HEALTH JOIN FORCES TO LAUNCH INNOVATIVE MEDICAL DEVICE PLATFORM

KKR and Hologic, Inc. unveil Maverix Medical, a groundbreaking platform, with investments from both entities. Ajax Health, led by Duke Rohlen, will manage the innovative venture.

ABOUT AJAX HEALTH

Innovative Product Portfolios:

- Building growth engines for MedTech companies
- Generating cutting-edge product portfolios

Premier Global Backing:

- Backed by top global private equity firms, including KKR
- Leveraging 20+ years of entrepreneurial, operational, and investment expertise

Strategic Presence:

- Headquartered in Menlo Park, CA
- Offices in New York City, Los Angeles, and Austin

ABOUT HOLOGIC, INC.

Innovative Medical Technology:

- Pioneering the world's first commercial 3D mammography system for early breast cancer detection

Comprehensive Health Solutions:

- Leading in testing for cervical cancer, sexually transmitted infections, and respiratory illnesses

Minimally Invasive Technologies:

- Offering solutions for uterine fibroids and abnormal uterine bleeding through advanced surgical technologies and vessel sealing devices

ABOUT KKR

Diverse Asset Management:

- Offering alternative asset management, capital markets, and insurance solutions globally

Strategic Investment Approach:

- Commitment to patient and disciplined investment strategies for attractive returns

Comprehensive Portfolio:

- Managing investment funds in private equity, credit, and real assets, with strategic partners overseeing hedge funds; insurance subsidiaries under Global Atlantic Financial Group offering retirement, life, and reinsurance products

MORE PEOPLE DIED BY SUICIDE IN 2022, BUT FEWER KIDS AND YOUNG ADULTS, SAYS CDC

SUICIDE REPORT 2022: KEY FINDINGS

Total Suicides:

49,449 in 2022
(3% Increase from 2021)

2021:

48,183 deaths

AGE AND GENDER TRENDS:

Male Suicide Rate:	1% Higher in 2022
Female Suicide Rate:	4% Higher in 2022

Racial Patterns:
Increase in Rates Across Most Racial Groups

Source: *National Center for Health Statistics, Wednesday Report*

SUICIDE RATES BY AGE GROUP (2021-2022):

Ages 10-14:
18% Decrease

Ages 15-24:
9% Decrease

Ages 25-34:
2% Decrease

Source: *National Center for Health Statistics, Year-over-Year Analysis*

MEDTRONIC CANCELS $738M PURCHASE OF INSULIN PATCH PUMP COMPANY EOFLOW

Medtronic's Acquisition Plan for EOFlow:

Announcement Date: Late May

Acquisition Terms:

- Purchase Price: 30,000 South Korean won per share for all existing shares

- Additional Funding: Share subscription agreement at 24,359 won per share for additional funding

Total Offer:

- Up to 971 billion won (Approximately $738 million U.S.)

Expected Closure:

- Second half of 2023, contingent on share acquisition and regulatory clearances for EOFlow's technology

Medtronic's Diabetes Management Expansion:

Buyout Purpose:

- Expansion of diabetes management offerings

Integration Plan:

- Incorporate EOFlow's wearable, wireless insulin pump with Medtronic's continuous glucose monitors and meal-detection algorithm

Benefits:

- Enhanced insulin delivery options
- Accessibility to a broader population with diabetes

FDA Clearance Status:

- EOFlow's patch pump pending FDA clearance (Application submitted late 2022)

Global Regulatory Approvals:

- Regulatory nods received in Europe, Indonesia, and the United Arab Emirates

An Introduction to
DIGITAL IMAGE ANALYSIS

Introduction

Digital image is the process of transforming an image into a digital form for performing certain operations. It provides us with useful information. The digital image analysis has synonyms attached to it. Image morphometry, automated cytophotometry, static image analysis, and many more. Digital Image Analysis is a method of quantifying the microscopic images of a cell. It is obtained by a digital conversion and computer analysis of the features of the image.

The algorithms of the digital image analysis improve the visual quality of the image that makes them sharper, clearer, and more informational. These algorithms can provide more accurate results than humans, especially for those tasks that require accurate measurements. The digital image analysis helps us to critically analyze an image and understand the exact meaning of it. The applications of image analysis are mainly earth sciences, remote sensing, cell biology, and medicine.

Understanding Digital Images

Digital image processing is the mechanism of using a computer to convert a digital image from its numerical representation to its output image. The numerical image can be presented in various ways as per the need of the viewer. It can also be influenced to enhance the diagnostic breakdown. It is now a part of the regular workflow of managing images. It is a routine day work for radiologists and technologists.

Let's have a look at four characteristics of digital images:

A digital image has four basic characteristics: Matrix, Pixels, Voxels, and Bit Depth.

1. Matrix:

A digital image is made up of a 2D formation of numbers called a matrix. A matrix is a rectangular arrangement of numbers, symbols or expressions arranged in rows and columns. Generally, diagnostic images are rectangular in shape and the matrix size or field of view (FOV) must be selected by the operator. The larger the image, the larger the matrix, and the more time it takes to process the image.

2. Pixel:

The boxes into the matrix are known as Pixel. Each pixel contains a discrete value that represents the brightness level. It reflects the tissue characteristics which are being photographed. The larger the matrix size, the smaller the pixel size and the better the spatial resolution.

The pixel size can be calculated as:
Pixel Size= FOV/Matrix

3. Voxel:

The pixels in the automated image represent the information existing in a volume of tissue in a patient. Such a volume is referred to as volume element or voxel. The volume element information is converted into numerical value and expressed in the pixel.

4. Bit Depth:

The number of bits or binary digits is called the bit depth. They encode the signal intensity of each pixel for the digital image. Digital images can be produced in black, white or bitonal. A color image is typically represented by a bit depth ranging from 8 to 24 or higher.

Different types of digital images (e.g., grayscale, color, binary)

A digital image pertains a finite set of elements called pixels. They are also known as picture elements or image elements. An image is represented in the form of a matrix where each element consists of a single pixel. Each pixel is the smallest point on the image that takes on a particular opaqueness, shade or color.

Some types of digital images are:

1. Binary images:

Binary images are the simplest type of images. These can take up two values, mostly 0 and 1, or black and white. A binary image is addressed as a 1-bit image as it takes only 1 binary digit to illustrate each pixel. This type of information is used in applications where the only information required is genera shape or outline. E.g Optical Character Recognition (OCR).

2. Gray-Scale Images:

These images are also known as monochrome (single-color) images. This does not use any color information, only gray-level information is available. The conventional gray-scale image contains 8 bits/pixel data, that allows us to have 256 different gray scale levels. The extra gray levels become useful when a small section of the image is made is made much larger to detect details.

3. Color images:

Color images can be modeled as three-band monochrome image data, where each band of data corresponds to a different color. The actual information stored in the digital image data is the gray-level information in each spectral band. Color images are represented as red, blue and green. Using the 8-bit monochrome standard as a model, the corresponding image would have 24-bits/pixel.

4. Multi-spectral images:

Multispectral images normally contain the information outside the normal human perceptual range. This includes X-ray, infrared, ultraviolet, and radar data. These are not images in the usual sense because the information presented is not directly visible to the human eye. The information is often shown in visual form by mapping the different spectral bands to RGB components.

III. Basics of Image Analysis

How is digital image processed?

Digital image processing is done by the use of algorithms and mathematical models to process and analyze digital images. The goal of digital image processing is to enhance the quality of images, extract significant content, and automate image-based tasks.

Steps involved in digital image processing are:

1. Image acquisition
2. Image enhancement
3. Image restoration
4. Image segmentation
5. Image representation and description
6. Image analysis
7. Image synthesis and compression

Common challenges in image analysis

Picture classification goes through a set of challenges too. Some of them are as follows:

1. Intra-class variation:

Intra-class variance is the difference in images from the same class. Having cars of various types in the dataset is an example of intra-class variance. They could be different models of various companies. This problem of intra-class variation can be solved using the picture categorization method.

2. Variation in perspective:

Humans have a perspective variation. It allows an item to be rotated in several dimensions depending on how it is shot. The object, of course, remains the same regardless of the angle from which it is snapped.

3. Illumination:

The picture categorization system should be able to cope with variations

in illumination as well. Picture this. If you have a painting of the same painting, each with a different amount of pixel intensity. The picture categorization system should be able to adapt to lighting changes. So, if we offer our image classification system a picture of the same item with varying brightness levels, the system should be able to assign the same levels.

4. Clutter in the background:

It signifies that the image contains a large number of things, making it difficult for the observer to locate the desired project. These photographs have a lot of “noise” to them. It is difficult to distinguish owing to the noise. It is a challenging assignment for a human. So you can think how difficult it is to process the same for a machine which has no conceptual knowledge about the image.

Advantages of Artificial Intelligence and Machine Learning on Digital Image Analysis:

1. Enhanced efficiency:

One of the vital benefits of artificial intelligence and machine learning is its ability to automate image processing tasks. The automation is done via machine learning algorithms. This enables you to handle a large amount of data, and complex image-processing tasks that would otherwise not be possible for humans alone. Machine learning improves the ability of gaining fast results.

2. Capable of handling large amounts of data:

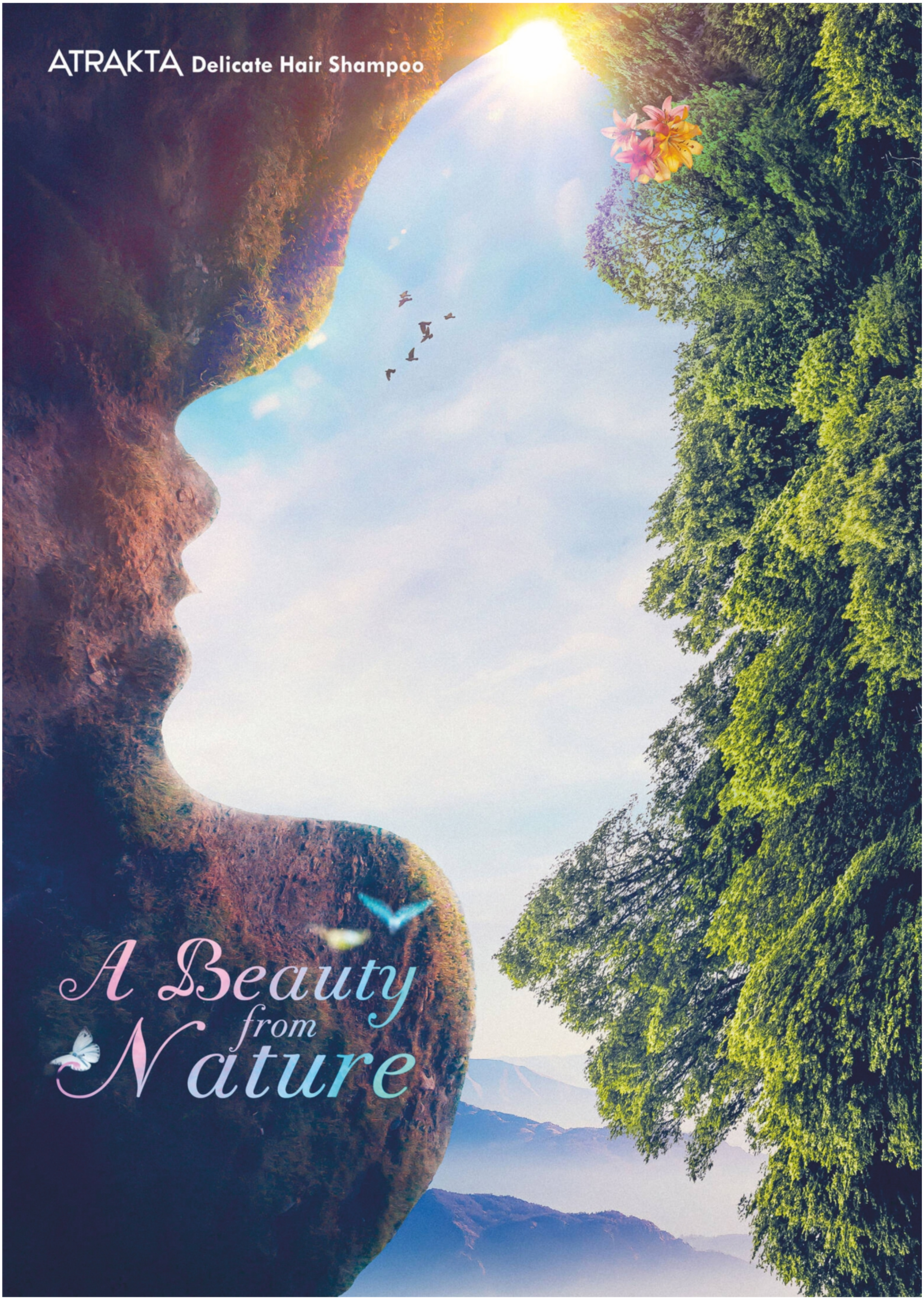
The quantity of data that machine learning or artificial intelligence can handle is immense. Using algorithms of these, large amounts of data processing happens very quickly, which is not possible to do manually. For eg. You can use a deep-learning algorithm to detect faces or objects in an image without having to manually draw boxes around each face or object.

3. Ability to learn and adapt:

With more training data and additional processing power, you can create better algorithms. An important benefit of using machine learning is the ability of it to improve results overtime. When a deep neural network is in use, the model gains access to larger variety of information about every pixel in an image. Thus, it makes more accurate decisions as compared to other types of models.

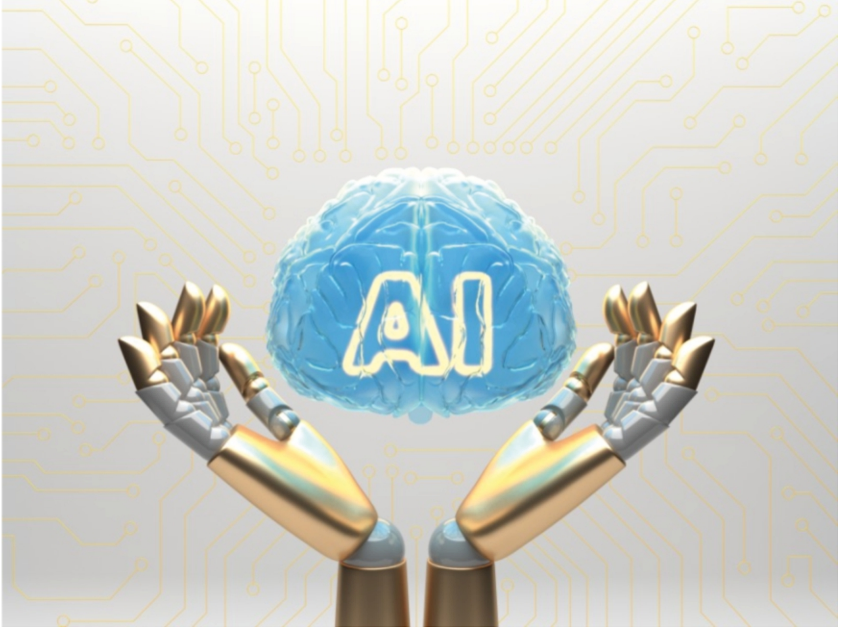
Conclusion

The digital images have made our life a lot easier in many ways. The amount of accuracy and precision it provides, has helped many sectors of work blossom overtime. Some applications in which digital image processing can be used are medical image retrieval, traffic sensing technologies, image reconstruction, and face recognition. The digital image analysis help these areas of work and have brought about significant changes making the functioning easier. The implementation of this technology has had a massive impact on many sectors of work. Almost all of the technical fields are impacted by it. As readers, we can explore the world of digital image processing more as it is a helpful source to detect any issues in our daily life.


ATRAKTA Delicate Hair Shampoo
A Beauty from Nature

Transforming Real-Time Diagnosis of Brain Tumors:

AI System Identifies Gliomas from Cryosection Images



A recent study conducted by researchers from Harvard Medical School, the University of Pennsylvania's Perelman School of Medicine, and Cedars-Sinai Medical Center has introduced a machine learning approach for cryosection pathology. This innovative model enables the accurate classification of gliomas using digital images of cryosection samples during surgery, showcasing the potential of artificial intelligence in facilitating real-time intraoperative brain cancer diagnosis.

Dr. Kun-Hsing “Kun” Yu, MD, PhD, an assistant professor at Harvard Medical School, led this research effort, addressing the clinical challenge of achieving precise brain cancer diagnoses during surgery. The AI models developed in this study offer real-time brain cancer diagnoses and predictions regarding molecular subtypes, providing invaluable support to neurosurgeons when determining treatment strategies.

The findings were published in the journal “Med."

The study sought to overcome the limitations of cryosection pathology, a critical process for neurosurgeons to rapidly and accurately assess tissue samples during brain tumor removal surgeries. Cryosectioning involves freezing tissue samples and rapidly evaluating them under a microscope to guide the surgical process.

Dr. Yu explained that neurosurgeons often send brain cancer samples to pathologists during surgery, who then utilize cryosection techniques to process and evaluate the tissue within 10-15 minutes. While cryosectioning is faster than traditional histology methods, the resulting image quality is lower, leading to potential diagnostic challenges and the

inability to determine specific diagnostic categories that now require genetic data.

To address these challenges, the researchers created a machine learning model called "Cryosection Histopathology Assessment and Review Machine" (CHARM). CHARM is a context-aware machine learning approach that uses a vision transformer to diagnose gliomas during surgery. It employs weakly supervised learning to analyze whole-slide images and provide slide-level labels for various diagnostic criteria. The model assigns separate predictions to each image tile, aggregating these predictions to provide a patient-level diagnosis.

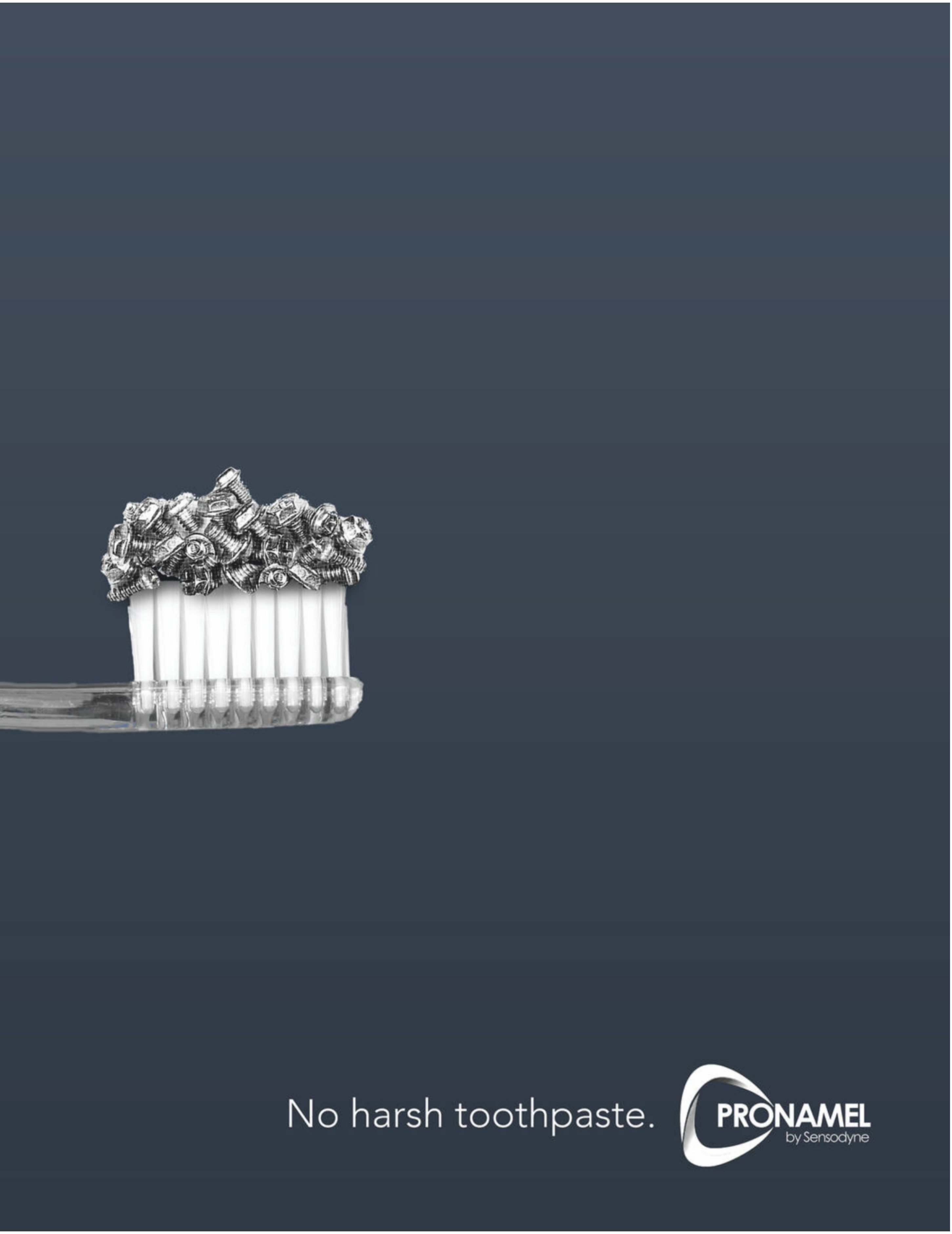
CHARM excels by integrating diagnostic signals from cancer cells and their surrounding tissues, which is a significant advantage when dealing with low-quality samples from different hospitals.

CHARM was evaluated using samples from over 1,500 glioma patients, demonstrating remarkable performance. It achieved an area under the curve (AUC) value of 0.98 for identifying malignant cells, outperforming conventional convolutional neural networks (CNNs) with an AUC of 0.88. The model accurately classified histologic grades and glioma subtypes in line with the 2021 WHO guidelines.

CHARM's quick diagnostic capabilities offer substantial benefits, as it can complete its analysis in less than a second compared to the several days required by standard molecular profiling methods. Additionally, it accurately predicts genetic alterations related to IDH mutations, ATRX, and TP53, contributing to more efficient glioma diagnosis during surgery.

A current limitation of the model is the need for standard tissue processing and digitization of cryosection images. However, emerging non-invasive tissue analysis methods could enhance CHARM's capabilities in the future.

The authors of the study have made their models and codes freely available for research in healthcare centers worldwide. They are also actively exploring the application of their approach to other types of brain cancers and resource-limited settings.


No harsh toothpaste.
PRONAMEL
by Sensodyne

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